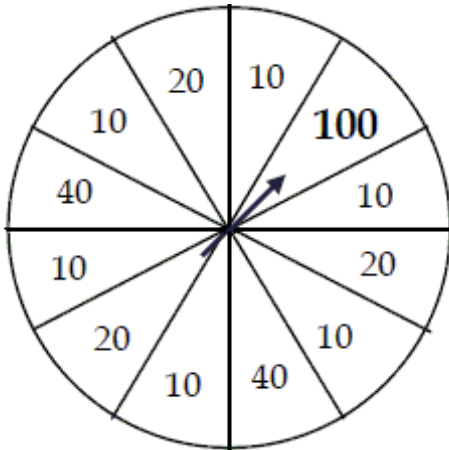


Name \_\_\_\_\_

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

A sporting goods store announces a "Wheel of Savings" sale. Customers select the merchandise they want to purchase, then at the cash register they spin a wheel to determine the size of the discount they will receive. The wheel is divided into 12 regions, like a clock. Six of those regions are red, and award a 10% discount. The three white regions award a 20% discount and two blue regions a 40% discount. The remaining region is gold, and a customer whose lucky spin lands there gets a 100% discount - the merchandise is free! *Show your work.*



- 1) What is the probability that none of the first four customers gets a discount over 20%? 1) \_\_\_\_\_
- 2) As you wait your turn in line there are three gold winners in a row. A lively discussion ensues between the next two customers. One thinks that streak about kills her chances of winning free merchandise, as the wheel won't come up gold again for a very long time. The other says that the wheel is clearly on a hot streak, so they are lucky to be next in line. Comment on their opinions. 2) \_\_\_\_\_
- 3) What is the probability that the first gold winner (100%) is the fifth customer in line? 3) \_\_\_\_\_
- 4) What is the probability that there is at least one gold winner among the first six customers? 4) \_\_\_\_\_

Ten little monkeys were jumping on a bed. There is a 35% chance that one will fall off and bump his head. In the bedroom next door, five kangaroos were jumping on a bed. Being more adept at jumping, there is only a 20% that a kangaroo will fall off the bed.

- 5) The monkeys manage to go a whole week without someone bumping their head. One of the kangaroos insists that they are due for an injury. Another says they must be getting better at their jumping skills. Do you think they're due for a crash? 5) \_\_\_\_\_
- 6) A manufacturing firm orders computer chips from three different companies: 10% from Company A; 20% from Company B; and 70% from Company C. Some of the computer chips that are ordered are defective: 4% of chips from Company A are defective; 2% of chips from Company B are defective; and 0.5% of chips from Company C are defective. A worker at the manufacturing firm discovers that a randomly selected computer chip is defective. What is the probability that the computer chip came from Company B? Show your work. 6) \_\_\_\_\_

Jacob has a bag of his favorite marbles. It has 3 red marbles, 4 blue and 10 of his most favorite color, neon orange.

- 7) What is the probability that if he removes 2 marbles without looking, that he will get two orange marbles? 7) \_\_\_\_\_
- 8) What are the chances that he as he removes marbles from the bag, he doesn't get an orange marble until his fourth attempt? 8) \_\_\_\_\_
- 9) For purposes of making on-campus housing assignments, a college classifies its students as Priority A (seniors), Priority B (juniors), and Priority C (freshmen and sophomores). Of the students who choose to live on campus, 10% are seniors, 20% are juniors, and the rest are underclassmen. The most desirable dorm is the newly constructed Gold dorm, and 60% of the seniors elect to live there. 15% of the juniors also live there, along with only 5% of the freshmen and sophomores. What is the probability that a randomly selected resident of the Gold dorm is a senior? Show your work clearly. 9) \_\_\_\_\_
- 10) For purposes of making budget plans for staffing, a college reviewed student's year in school and area of study. Of the students, 22.5% are seniors, 25% are juniors, 25% are sophomores, and the rest are freshmen. Also, 40% of the seniors major in the area of humanities, as did 39% of the juniors, 40% of the sophomores, and 36% of the freshmen. What is the probability that a randomly selected humanities major is a junior? Show your work. 10) \_\_\_\_\_
- 11) A biology professor responds to some student questions by e-mail. The probability model below describes the number of e-mails that the professor may receive from students during a day. 11) \_\_\_\_\_

E-mails received	0	1	2	3	4	5
Probability	0.05	0.10	0.20	0.25	0.30	0.10

- How many e-mails should the professor expect to receive each day?
- What is the standard deviation?
- If it takes the professor an average of ten minutes to respond to each e-mail, how much time should the professor expect to spend responding to student e-mails each day?

A cell phone company offers a simple extended warranty plan. If your phone is damaged, they will repair it for up to \$50. If you lose or destroy your phone, they will give you a \$200 voucher towards a new phone. The company believes that 5% of customers will need the replacement voucher and 10% will request a repair.

- 12) What is the standard deviation of their profit? 12) \_\_\_\_\_

A fast food restaurant just leased a new freezer and food fryer for three years. The service contract for the freezer offers unlimited repairs for a fee of \$125 a year plus a \$35 service charge for each repair needed. The restaurant's research suggested that during a given year 80% of these freezers need no repairs, 11% needed to be serviced once, 5% twice, 4% three times, and none required more than three repairs.

- 13) Find the expected number of repairs this kind of freezer is expected to need each year. Show your work. 13) \_\_\_\_\_
- 14) The yearly service contract for the food fryer estimates a mean annual cost of \$140 with a standard deviation of \$40. What is the expected value and standard deviation of the total cost for the service contracts for the freezer and the food fryer? 14) \_\_\_\_\_

A small business just leased a new computer and color laser printer for three years. The service contract for the computer offers unlimited repairs for a fee of \$100 a year plus a \$25 service charge for each repair needed. The company's research suggested that during a given year 86% of these computers needed no repairs, 9% needed to be repaired once, 4% twice, 1% three times, and none required more than three repairs.

- 15) Which service contract should the company expect to cost more each year? How much more? With what standard deviation? 15) \_\_\_\_\_

The owner of a pet store is trying to decide whether to discontinue selling specialty clothes for pets. She suspects that only 4% of the customers buy specialty clothes for their pets and thinks that she might be able to replace the clothes with more interesting and profitable items on the shelves. Before making a final decision she decides to keep track of the total number of customers for a day, and whether they purchase specialty clothes for their pet.

- 16) What is the probability that at least 3 of the first 40 customers buy specialty clothes for their pet? Show work. 16) \_\_\_\_\_

- 17) The owner had 275 customers that day. Assuming this was a typical day for her store, what would be the mean and standard deviation of the number of customers who buy specialty clothes for their pet each day? 17) \_\_\_\_\_

The owner of a small convenience store is trying to decide whether to discontinue selling magazines. He suspects that only 5% of the customers buy a magazine and thinks that he might be able to use the display space to sell something more profitable. Before making a final decision he decides that for one day he'll keep track of the number of customers and whether or not they buy a magazine.

- 18) He had 280 customers that day. Assuming this day was typical for his store, what would be the mean and standard deviation of the number of customers who buy magazines each day? 18) \_\_\_\_\_

- 19) What is the probability that at least 5 of his first 50 customers buy magazines? 19) \_\_\_\_\_

A young boy is fishing off the end of a dock. He estimates that for one out of every 15 times he casts his line, he gets at least a nibble from a curious fish. He is going to cast his line 50 times before he switches to toad hunting.

- 20) What is the probability that he will cast his line without success 20 times before finally succeeding the 21st time? 20) \_\_\_\_\_

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

A bicycle shop equips 60% of their bikes with a water bottle holder. 55% of the bikes they sell have a kickstand attached to the bike. 34% of the bikes sold have both features.

- 21) Given that a randomly selected bike has a kickstand, what are the chances that it also has a water bottle holder? 21) \_\_\_\_\_

A) 56.7%      B) 26%      C) 61.8%      D) 21%      E) 34%

- 22) A supermarket claims that their checkout scanners correctly price 99.8% of the items sold. How many items would you expect to buy, on average, to find one that scans incorrectly? 22) \_\_\_\_\_

A) 99.8      B) 998      C) 200      D) 500      E) 2

23) Which of these has a geometric model?

23) \_\_\_\_\_

- A) The colors of the cars in the grocery store parking lot.
- B) The number of hits a baseball player gets in 6 times at bat.
- C) The number of black cards in a 10-card hand.
- D) The number of people we survey until we find someone who owns an iPod.
- E) The number of cards drawn from a deck until we find all four aces.

24) Here is the distribution of workers a restaurant keeps on staff during a 1-hour shift.

24) \_\_\_\_\_

probability	0.10	0.25	0.55	0.10
# of workers	3	4	5	6

If the workers are paid \$10/hour, what is the expected long-term cost of a 1-hour shift?

- A) \$45
- B) none of these
- C) \$46.50
- D) \$4.65
- E) \$180

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

25) Basketball player heights Assume the heights of high school basketball players are normally distributed. For boys the mean is 74 inches with a standard deviation of 4.5 inches, while girl players have a mean height of 70 inches and standard deviation 3 inches. At a mixed 2-on-2 tournament teams are formed by randomly pairing boys with girls as teammates.

25) \_\_\_\_\_

- a. On average, how much taller do you expect the boy to be?
- b. What will be the standard deviation of the difference in teammates' heights?
- c. On what fraction of the teams would you expect the girl to be taller than the boy?